



## Study of the effect of prolactin on FSH and LH hormones and fertility in women in Tobra – Libya

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### Abstract:

The prolactin hormone (PRL) has a distinct activity among the rest of the hormones, so this study conducted to measure the level of this hormone and its relationship with Follicle Stimulating Hormone (FSH) and Luteinizing Hormone (LH). The study performed on a group of 30 women with a wide age range in the city of Tobra (east of Benghazi) to find out the percentage of PRL hormone and the extent of its effect on the FSH And LH hormones, as well as on fertility in these women. The results showed that 24 samples of the total samples, with a rate of 80%, had a normal concentration of PRL hormone, and 6 samples of the total samples, and by 20%, suffered an increase in the concentration of the PRL hormone. The concentration of FSH and LH was measured for the same samples for which the PRL hormone was measured, and the statistical analysis using the T test at significant values ( $P < 0.05$ ) showed that prolactin has a clear significant effect on the luteinizing hormone, while it has a slight effect of a non-significant value on the FSH. . Likewise, for average ages with FSH, LH, and PRL, there were strong significant differences between all hormones and age. This study concluded that the high PRL hormone might be a cause of delayed childbearing through its effect on the FSH hormones.

**Key words:** Prolactin Hormone - Follicle Stimulating Hormone - Luteinizing Hormone - Fertility - Tobra, Libya.

### Introduction:

The hormones together with the nervous system are the main regulating factor in the body because of their influence on human life, especially sex hormones, which are responsible for the reproductive process and its continuation, thus they have a major role in the continuation of life and the

production of new individuals. The Hypothalamus pituitary ovarian axis controls the development and maturation of the follicular maturation of the ovaries from which the ovum is produced and ovulation [1].

The hypothalamus plays a major role in regulating the menstrual cycle through its secretion of Gonadotropin Releasing Hormone (GnRH), which stimulates the pituitary gland to secrete PRL, LH and FSH hormones. Recent studies have shown that PRL may also produced by many extrapituitary cell [2]. FSH and LH are glycoprotein hormones secreted from the anterior part of the pituitary gland specifically from B-Cells in response to the secretion of GnRH hormone from the hypothalamus [3].

The FSH hormone works on the growth and development of the ovarian follicles, while the LH hormone is responsible for the ovulation process from the ovaries after the maturation of follicles, so it sometimes known as the ovulation hormone. LH works in conjunction with follicle-stimulating hormone (FSH). The rise in estrogen tells the pituitary gland to stop producing FSH and to start making more LH. The shift to LH causes the egg to be released from the ovary, a process called ovulation .general, higher than normal levels of LH in a woman may mean the ovaries are absent or not functioning. In a young woman, high levels may mean that puberty is early Low levels of LH in the blood may indicate anorexia, an issue in the pituitary gland, stress, or damage to the hypothalamus in both men and women. [4].

The PRL hormone works during the stage of physiological activity when the female reaches puberty. The PRL hormone is one of the important hormones for women and its function are to regulate the process of breastfeeding in the natural state. Any decrease in the level of this hormone leads to disorders and the outcome of these disorders is sterility [5; 6]. Prolactin plays an important role in the reproductive health of both women and men. Its main role, however, is to stimulate the production of milk in women after childbirth. In other words, prolactin triggers lactation. Levels of prolactin have found to be a measure of sexual satisfaction in both men and women [7].

The level of PRL hormone is low in the first half of the menstrual cycle Follicular phases and rises in the second half luteal phases. However, during

pregnancy the hormone level in the blood gradually rises to reach the maximum level after birth to form milk for breastfeeding, afterword the hormone decreases. PRL level increase gradually after birth until it reached its normal level within a maximum range of about four weeks. The elevation of PRL hormone levels causes hormonal abnormalities leading to disturbances in the menstrual cycle in women, failure to ovulate and growth of ovarian follicles [8].

Recently, hormonal disturbances have considered of great importance in the knowledge of causes and diagnosis of female infertility. An increase in FSH in women may indicate a reduction in the production of good quality eggs and embryos for fertilization. A woman's chances for pregnancy may be lower than expected for her age. However, it does not mean she has no chance of conceiving. She may have more difficulty conceiving and may require infertility treatment [7].

An ovulation is an important cause of infertility in women; hormonal anomalies that affect ovulation include hyperthyroidism, hypothyroidism, and hyperprolactinemia [9]. Several lifestyle factors may affect reproduction, including habits of diet, clothing, exercise, and the use of alcohol, tobacco, and recreational drugs. Exposure to textile dyes, lead, mercury and cadmium, volatile organic solvents and pesticides has been also associated with infertility [10].

In this study, we tried to find the relationship between the percentage of the PRL, FSH and LH hormones.

## **Materials and methods:**

### **1-Blood samples:**

This study included 30 random samples of women between the ages of (17-50) from Tocra city in eastern Libya, in the period (from January to November 2020). 10 ml of venous blood was withdrawn and placed in tubes free of clotting materials, where a centrifugation process conducted to separate the blood serum.

### **2- Hormonal criteria:**

This study included estimating the percentage of prolactin hormone (PRL), follicle-stimulating hormone (FSH) and luteinizing hormone (LH) in blood serum. We used the enzyme-linked immunosorbent assay (ELISA) described in and respectively [1; 8; 11] in estimating the concentration of these hormones.

### 3-Statistical analysis

The results analyzed statistically by using the statistical program (SPSS) that included the arithmetic mean, standard deviation (Mean  $\pm$  S.E) and T test.

### Results:

It is clear from Table (1) that the level of PRL hormone for most samples is within normal rates of the hormone, and as shown in Figre (1). It also shows that the FSH of most samples is in the ovulation phase, while the level of the LH hormone is in the luteal phase.

The results showed that 24 samples of the total samples, with a rate of 80%, had a normal concentration of the hormone PRL, and 6 samples of the total samples, by 20%, suffered from an increase in the concentration of PRL hormone. This agree Sudha and Reddy [11].

**Table No. (1) Shows the level of hormones (PRL, FSH & LH)**

LH level (MIU\ML)	FSH level (MIU\ML)	PRL level (NG\ML)	N
10.89 $\pm$ 2.09	12.61 $\pm$ 2.48	22.11 $\pm$ 4.65	30

Statistically significant at a likelihood level (p <0.05)

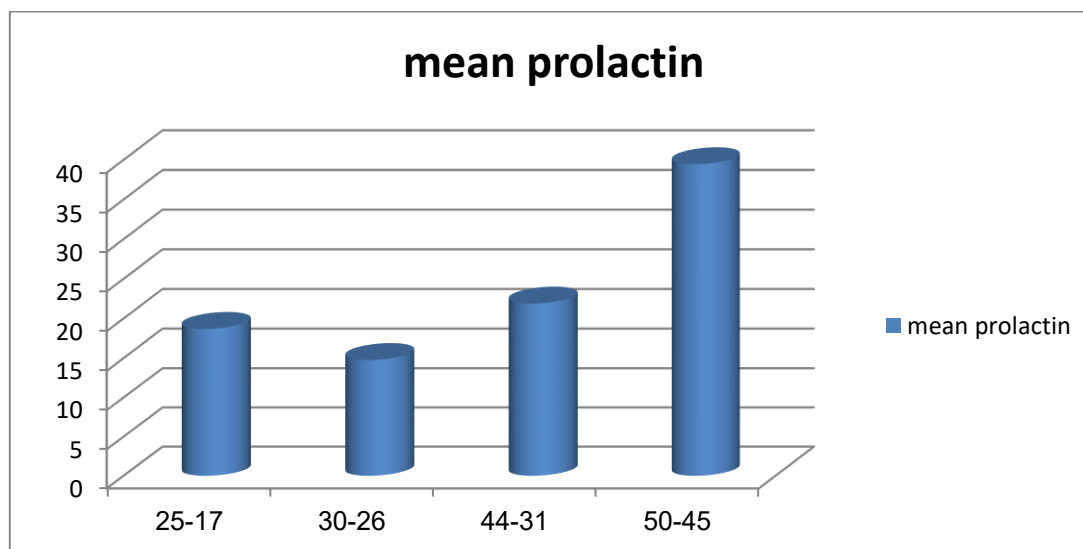


Figure No. (1) Shows the values of the hormone prolactin within the age groups.

It is evident from the statistical analysis of the T-test at significant values ( $P < 0.05$ ) and from Figures (2, 3) that the PRL hormone has a clear significant effect on the LH ( $5.33 \pm 9.495$ ), while its effect has a slight non-significant value on FSH hormone ( $5.36 \pm 5.3$ ). (11.208).

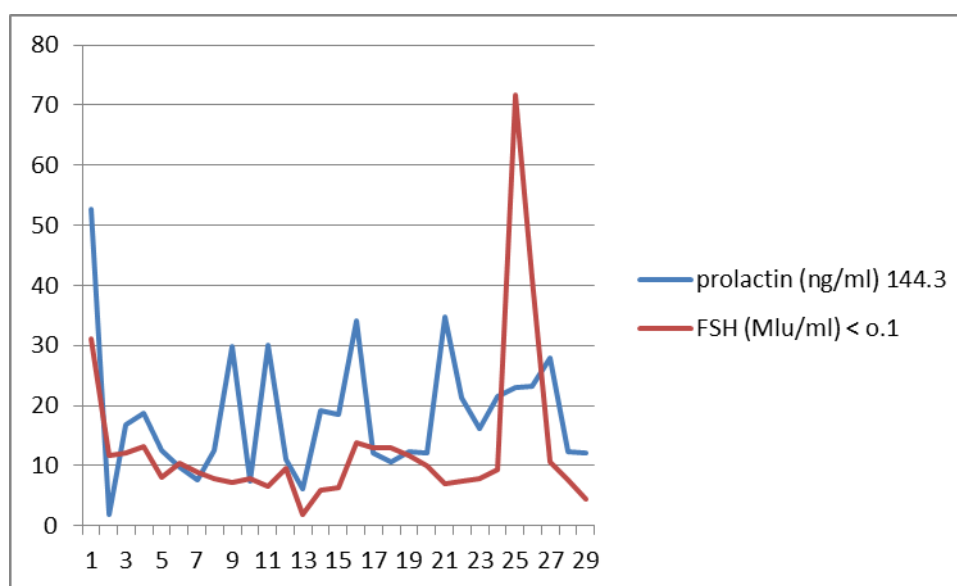


Figure No. (2) Shows effect of PRL hormone on FSH hormone

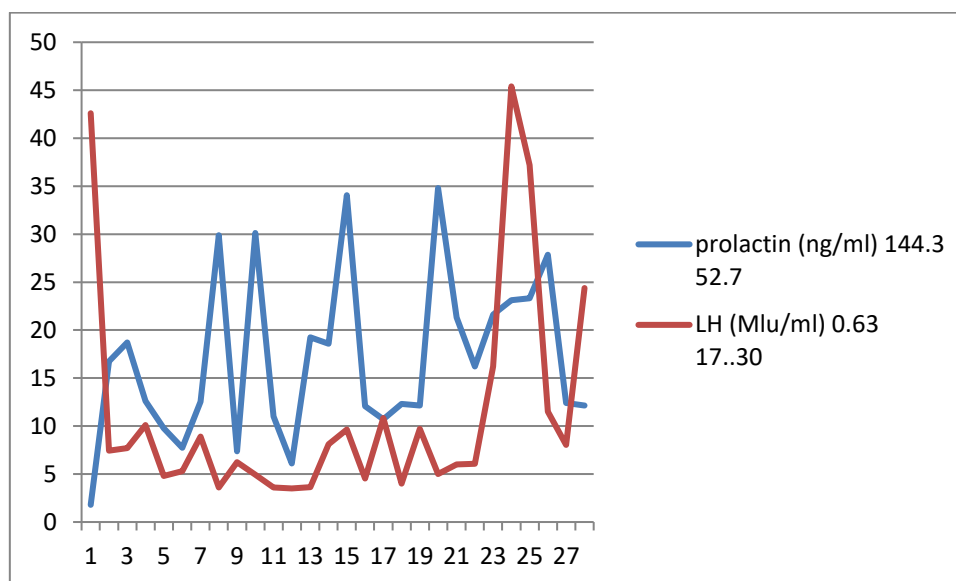


Figure No. (3) Shows effect of PRL hormone on LH hormone

The results of the statistical analysis showed that there were significant differences between the mean ages in PRL, as well as between FSH and LH hormones and age. As shown in Figure 4.

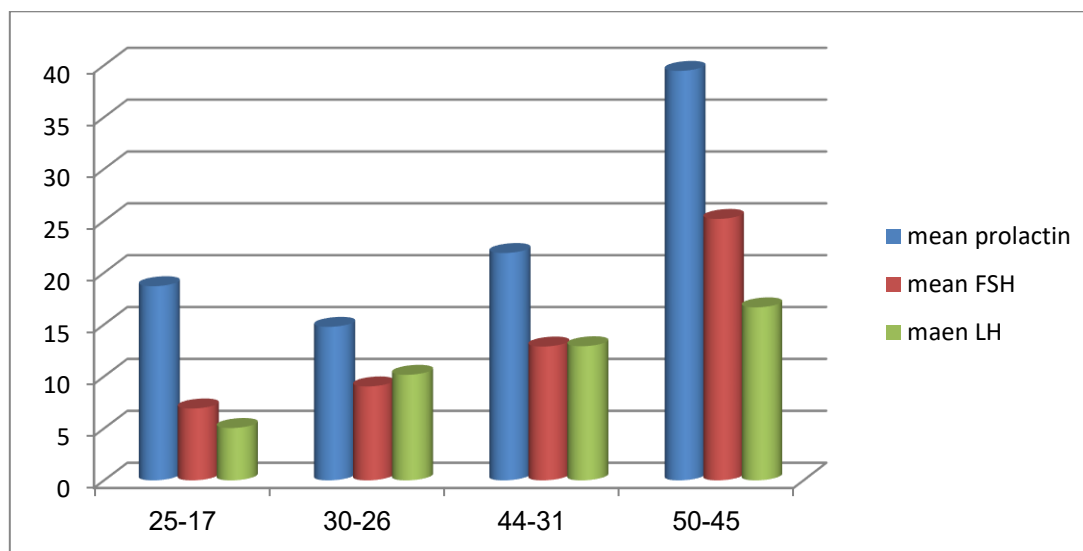


Figure 4: Shows effect of age on the levels of FSH, LH, PRL hormones.

**Table No. (2) The effect of different ages on the levels of FSH, LH, PRL hormones**

Age	Mean LH	Mean FSH	Mean PRL
17-25	5.04	6.92	18.7
26-30	10.16	9.04	14.78
31-44	12.91	12.88	21.9
45-50	16.66	25.19	39.47

Statistically significant at a likelihood level ( $p < 0.05$ )

## Discussion:

The elevation of PRL hormone has an effect on the levels of FSH and LH hormones. Whereas, the significant increase in the level of the PRL hormone led to a decrease in the level of FSH hormone, which is due to the effect of PRL hormone on the hypothalamus, which inhibits the release of hormones producing GnRH of the pituitary gland [4].

Nam and his colleagues explained that the decrease in FSH caused by the effect of the anterior lobe of the pituitary gland, which inhibits the release of hormones released to the gonads. Thus, this decrease in FSH might work to prevent the development of the ovarian follicles, which impedes their access to the mature graffian follicle, one of the reasons that may cause a lack of ovulation or pregnancy and a decrease in the fertility of women who suffer from high prolactin hormone.

The relationship between PRL and luteinizing hormone (LH) is due to the effect on the level of LHRH hormone in the hypothalamus. This leads to the fact that the increasing level of PRL hormone cause a decrease in the secretion of LH [12]. According to [12, 13], a decrease in the level of the LH hormone reduces or prevents ovulation, which causes a decrease in female fertility.

It can be concluded that hormonal imbalance for (LH, FSH and prolactin) is just a minor suspected etiologic factor in causing infertility in the studies women, it seems that the level of FSH increases with age and the level of prolactin slightly decreases with age [5].

In addition, the results of the statistical analysis showed that there were significant differences with respect to age and PRL hormone, and thus age does clearly affect the FSH and LH hormones according to these results.

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## دراسة تأثير هرمون البرولاكتين على هرموني FSH, LH والخصوبة لدى النساء في مدينة توكرة-ليبيا

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### ملخص:

لهرمون البرولاكتين PRL نشاط متميز عن باقي الهرمونات، لذلك أجريت هذه الدراسة لقياس مستوى هرمون PRL وعلاقته بهرموني FSH و LH لدى مجموعة من النساء مكونة من 30 عينة ذات مدى عمري واسع في مدينة توكرة (شرق مدينة بنغازي)، لمعرفة نسبة هرمون PRL ومدى تأثيره على هرموني FSH و LH، كذلك على الخصوبة لدى هؤلاء النساء. حيث أظهرت النتائج أن 24 عينة من إجمالي العينات وبنسبة 80% كان تركيز هرمون PRL فيها طبيعي، و 6 عينة من إجمالي العينات وبنسبة 20% تعاني من ارتفاع في تركيز هرمون PRL. وقد تم قياس تركيز هرمون FSH وهرمون LH لنفس العينات التي تم قياس هرمون PRL لها فأظهر التحليل الإحصائي باستخدام اختبار T عند قيم معنوية ( $P < 0.05$ ) أن لهرمون البرولاكتين تأثيرا معنويا واضح على الهرمون اللوتيني بينما تأثيره طفيف وذو قيمة غير معنوية على الهرمون المحفز للجريبات FSH. أما بالنسبة لمتوسط الأعمار مع FSH و LH و PRL فتوجد فروق معنوية قوية بين كل منها. وخلصت هذه الدراسة إلى أن ارتفاع هرمون PRL قد يكون السبب في تأخر الإنجاب من خلال تأثيره على هرموني FSH و LH.

**الكلمات المفتاحية:** هرمون البرولاكتين، الهرمون المحفز للجريبات، الهرمون اللوتيني، الخصوبة، توكرة، ليبيا.